FUTURE FISHERIES IMPROVEMENT PROGRAM
GRANT APPLICATION
(please fill in the highlighted areas)

I. APPLICANT INFORMATION

A. Applicant Name: Montana Fish, Wildlife & Parks (Carol Endicott, project manager)

B. Mailing Address: 1354 Highway 10 West

C. City: Livingston State: MT Zip: 59047

Telephone: (406) 222-3710 (cendicott@mt.gov)

D. Contact Person: Carol Endicott

Address if different from Applicant:

City: State: Zip:

Telephone:

E. Landowner and/or Lessee Name (if other than Applicant): Church Universal & Triumphant
Alan Shaw (Business Manager)

Mailing Address: 63 Summit Way

City: Gardiner State: Montana Zip: 59030

Telephone: 406-848-9294

II. PROJECT INFORMATION*

A. Project Name: Mulherin Creek Fish Screen and Yellowstone Cutthroat Trout Entrainment Prevention

River, stream, or lake: Mulherin Creek (also known as Mol Heron Creek)

Location: Township 8S Range 7E Section 24

County: Park County

B. Purpose of Project:
The purpose of this project is to prevent the entrainment of fluvial Yellowstone cutthroat trout adults and outmigrating fry into an irrigation system.

C. Brief Project Description:

This project entails installation of a Farmers Screen™ at an irrigation diversion on Mulherin Creek near Corwin Springs. Mulherin Creek is the 3rd greatest producer of Yellowstone cutthroat trout fry to the Yellowstone River; however, fry trapping determined a substantial portion of outmigrating fry become entrained in the canal. Furthermore, a substantial number of fluvial spawners have been found in thecanal, or dead in irrigated fields. The Farmer's Screen will block entrainment of fry, juvenile, and adult fish, while allowing delivery of water to its point of use.

D. Length of stream or size of lake that will be treated: The project will modify the up to 20 feet of bank with installation and armoring of the head gate. About 15 feet of the stream bed will be modified with large rock and concrete blocks to divert water to the head gate

E. Project Budget:

Grant Request (Dollars): $ 40,000

Contribution by Applicant (Dollars): $ _____ In-kind $ _____
(salaries of government employees are not considered as matching contributions)

Contribution from other Sources (Dollars): $ 40,870 In-kind $ _____
(attach verification - See page 2 budget template)

Total Project Cost: $ 80,870

F. Attach itemized (line item) budget – see template
See Attachment A

G. Attach specific project plans, detailed sketches, plan views, photographs, maps, evidence of landowner consent, evidence of public support, and/or other information necessary to evaluate the merits of the project. If project involves water leasing or water salvage complete supplemental questionnaire (fwp.mt.gov/habitat/futurefisheries/supplement2.doc).
See Attachment B

H. Attach land management and maintenance plans that will ensure protection of the reclaimed area.

III. PROJECT BENEFITS*

A. What species of fish will benefit from this project?
Yellowstone cutthroat trout is the species targeted to benefit from this project; however, the fish screen will prevent all species from being entrained.

B. How will the project protect or enhance wild fish habitat?
This project is not a habitat improvement project, but an entrainment prevention project. The goal is to prevent entrainment of spawning adults and outmigrating fry .

C. Will the project improve fish populations and/or fishing? To what extent?

This project will conserve and improve angling opportunities for native Yellowstone cutthroat trout within the Yellowstone River. Mulherin Creek is one of the "high quality" spawning streams for Yellowstone cutthroat trout and the 3rd largest producer of Yellowstone cutthroat trout fry. Entrainment of fry is considerable at this diversion. An overnight fry trap set in the canal captured 21 Yellowstone cutthroat trout fry, whereas only 2 were captured in the stream. Adults are also entrained, with adult fish found in the canal, and numerous dead fluvial Yellowstone cutthroat trout present in an irrigated pasture. The extent to which preventing entrainment will improve fish populations is unknown; however, pre- and post-construction monitoring of numbers of drifting fry will provide a measure of potential recruitment. In addition, regular monitoring in the Yellowstone River will allow investigation of response in terms of number of adult fish in the river.

D. Will the project increase public fishing opportunity for wild fish and, if so, how?

This project will increase public fishing opportunity for a wild, riverine population of Yellowstone cutthroat trout. Fluvial, riverine populations of cutthroat trout are increasingly rare with most of the remaining populations relegated to high elevation and difficult to access streams, especially east of the Continental Divide in Montana. The Yellowstone River still supports fluvial Yellowstone cutthroat trout along much of its length in Park and Sweet Grass counties. Nonetheless, Yellowstone cutthroat trout are vulnerable during spawning and early life history stages and entrainment is among the causes of their decline.

E. If the project requires maintenance, what is your time commitment to this project?

FWP personnel and water user will monitor and maintain the structure for the first year. Once the potential problems and troubleshooting are evaluated, the water user will be responsible for maintenance of the screen, although FWP personnel will still be involved in providing assistance in screen management.

F. What was the cause of habitat degradation in the area of this project and how will the project correct the cause?

This project does not address habitat degradation, but complements water leases to maintain adequate in-stream flow during the sensitive incubation and outmigration periods. Mulherin Creek retains high quality habitat in this portion of the stream and Yellowstone cutthroat trout make heavy use of it for spawning. Entrainment of fry and adults into irrigation canals is one of the primary limiting factors in supporting robust populations of Yellowstone cutthroat trout in the Yellowstone River. Therefore, this problem addresses one of the key limiting factors for Yellowstone cutthroat trout in the river.

G. What public benefits will be realized from this project?:

The project will provide considerable benefit to the public. The Yellowstone River is one of the most heavily fished rivers in Montana and angling is a major contributor to the local economy. By increasing Yellowstone cutthroat trout populations in-state and out-of-state anglers will have improved potential to catch native cutthroat trout in a beautiful setting. Local guides report considerable fondness for Yellowstone cutthroat trout as they are easy to catch, and provide new anglers with a high potential for success.

Another public benefit relates to the potential for Yellowstone cutthroat trout to be listed as threatened or endangered under the Endangered Species Act (ESA). Locally led conservation actions indicate these efforts are sufficient to protect, secure, and restore Yellowstone cutthroat trout within its historic range and reduce the probability of listing. Conservation efforts with Arctic grayling demonstrate the effectiveness of conservation in terms of securing populations and preventing listing under the ESA

H. Will the project interfere with water or property rights of adjacent landowners? (explain):

No.

I. Will the project result in the development of commercial recreational use on the site?: (explain):

No.

J. Is this project associated with the reclamation of past mining activity?:

No.

Each approved project sponsor must enter into a written agreement with the Department specifying terms and duration of the project.

IV. AUTHORIZING STATEMENT

I (we) hereby declare that the information and all statements to this application are true, complete, and accurate to the best of my (our) knowledge and that the project or activity complies with rules of the Future Fisheries Improvement Program.

Applicant Signature: Carol Endicott Date: 12/1/14

Sponsor (if applicable):

***Highlighted boxes will automatically expand.**

Mail To:

Montana Fish, Wildlife & Parks
Habitat Protection Bureau
PO Box 200701
Helena, MT 59620-0701

Incomplete or late applications will be returned to applicant.

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Applications may be rejected if this form is modified.

*****Applications may be submitted at anytime, but must be received by the Future Fisheries Program office in Helena before December 1 and June 1 of each year to be considered for the subsequent funding period.*****

Attachment A: Budget

WORK ITEMS (ITEMIZE BY CATEGORY)	NUMBER OF UNITS	UNIT DESCRIPTION*	COST/UNIT	TOTAL COST	CONTRIBUTIONS			
					FUTURE FISHERIES REQUEST	IN-KIND SERVICES	IN-KIND CASH	TOTAL
Personnel								
Survey			completed in house					$ -
Design			completed in house					$ -
Plans and Specifications			completed in house					$ -
Construction cost estimate			completed in house					$ -
Oversight			completed in house					$ -
Site Preparation & Revegetation								
Mobilizatiion & demobilization	1	lump sum	$ 4,920	$ 4,920			$ 4,920	$ 4,920
Revegation and reclamation	1	lump sum	$ 1,800	$ 1,800			1,800.00	$ 1,800
Fish Screen Installation and Purchase								
Intake head gate	1	lump sum	$ 3,000	$ 3,000		$ -	$ 3,000	$ 3,000
Concrete	10	cubic yards	$ 2,400	$ 24,000		$ -	$ 24,000	$ 24,000
Pipe (12-inch diameter)	100	linear feet	$ 42	$ 4,200		$ -	$ 4,200	$ 4,200
Fish screen purchase & supervised installation	1	lump sum	$ 42,950	$ 42,950	$ 40,000	$ -	$ 2,950	$ 42,950
			TOTALS	$ 80,870	$ 40,000	$ -	$ 40,870	$ 80,870

*Units = feet, hours, inches, lump sum, etc.

CONTRIBUTOR	TOTAL
FFIP	$ 40,000
BBN	$ 25,870
Montana Chapter of the American Fisheries Society	$ 5,000
Joe Brooks Chapter	$ 5,000
Montana Trout Foundation	$ 5,000
	$ 80,870

Attachment B

Attach specific project plans, detailed sketches, plan views, photographs, maps, evidence of landowner consent, evidence of public support, and/or information necessary to evaluate the merits of the project. If the project involves water leasing or water salvage complete supplemental questionnaire (fwp.mt.gov/habitat/futurefisheries/supplement2.doc).

Mulherin Creek (Figure 1) is a tributary of the Yellowstone River, originating in Yellowstone National Park. Mulherin Creek flows through a patchwork of public and private lands before its confluence with the Yellowstone. This stream was identified as an important Yellowstone cutthroat trout spawning stream beginning in the early 1970s (Berg 1975). Subsequent investigations have confirmed its importance as a spawning stream, and a source of recruitment to the Yellowstone River (Clancy 1988; Roulsen 2002; DeRito 2010).

Irrigation diversions can provide a sink for spawning adults and outmigrating fry. The potential for the target diversion to entrain fish is significant. Fry trapping found more fry in the canal than were captured in Mulherin Creek (FWP unpublished data). Electrofishing in the canal did not yield any Yellowstone cutthroat trout; however, numerous, yearling rainbow trout were present. Radio-tagged adults were found in the irrigation canal, as were several non-tagged fish. Several fish were found dead in the irrigated pasture (J. DeRito, Trout Unlimited, personal communication).

This project is consistent with goals and objectives for Yellowstone cutthroat trout conservation (MCTSC 2007; Endicott et al. 2013). Among the highest priorities for conservation are to protect nonhybridized populations and diverse life history strategies. Nonhybridized Yellowstone cutthroat trout spawn in Mulherin Creek, making this stream a high priority. Moreover, this project would protect the fluvial life history strategy. The presence of fluvial, riverine cutthroat trout is an increasingly rare phenomenon, with most remaining populations relegated to high elevation streams that are protected by a barrier from nonnatives. The reason that nonhybridized Yellowstone cutthroat trout have been able to exist in sympatry with rainbow trout is that they spawn at different times (DeRito 2010). Rainbow trout spawn on the rising limb of the spring hydrograph, while Yellowstone cutthroat trout spawn mostly on the descending limb. This temporal segregation in spawning has allowed Yellowstone cutthroat trout to remain in the Yellowstone River despite 100 years of coexisting with rainbow trout.

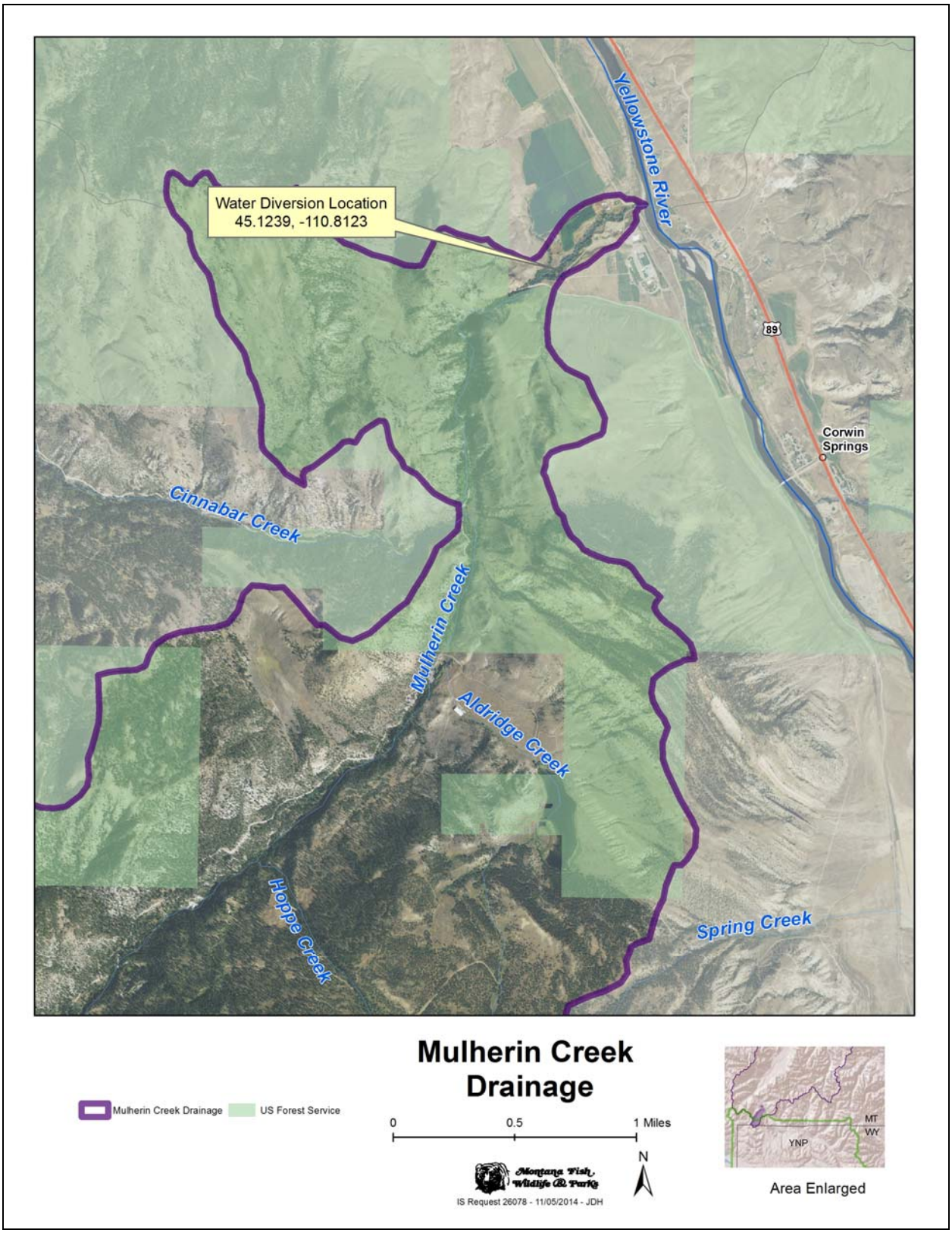


Figure 1. Map of Mulherin Creek watershed.

Screening of this ditch has had a long, colorful history. In the 1990s, an infiltration gallery

(Figure 2) was installed. The infiltration gallery entailed a series of perforated pipes buried in the streambed. These pipes delivered water to a mostly buried collection pipe that led to the canal. Unfortunately, sediment clogged the gallery, and the water user cut a hole in a portion of exposed pipe to allow delivery of water (Figure 3). This modification allowed fry and fluvial spawners to become entrained in the canal, and eliminated the functionality of the infiltration gallery as a means to prevent entrainment. The irrigation diversion remains in this condition to this day. This experience underscores the need to provide a low maintenance, self-cleaning fish screen for the convenience of the water user and to protect the investment in fish screening.

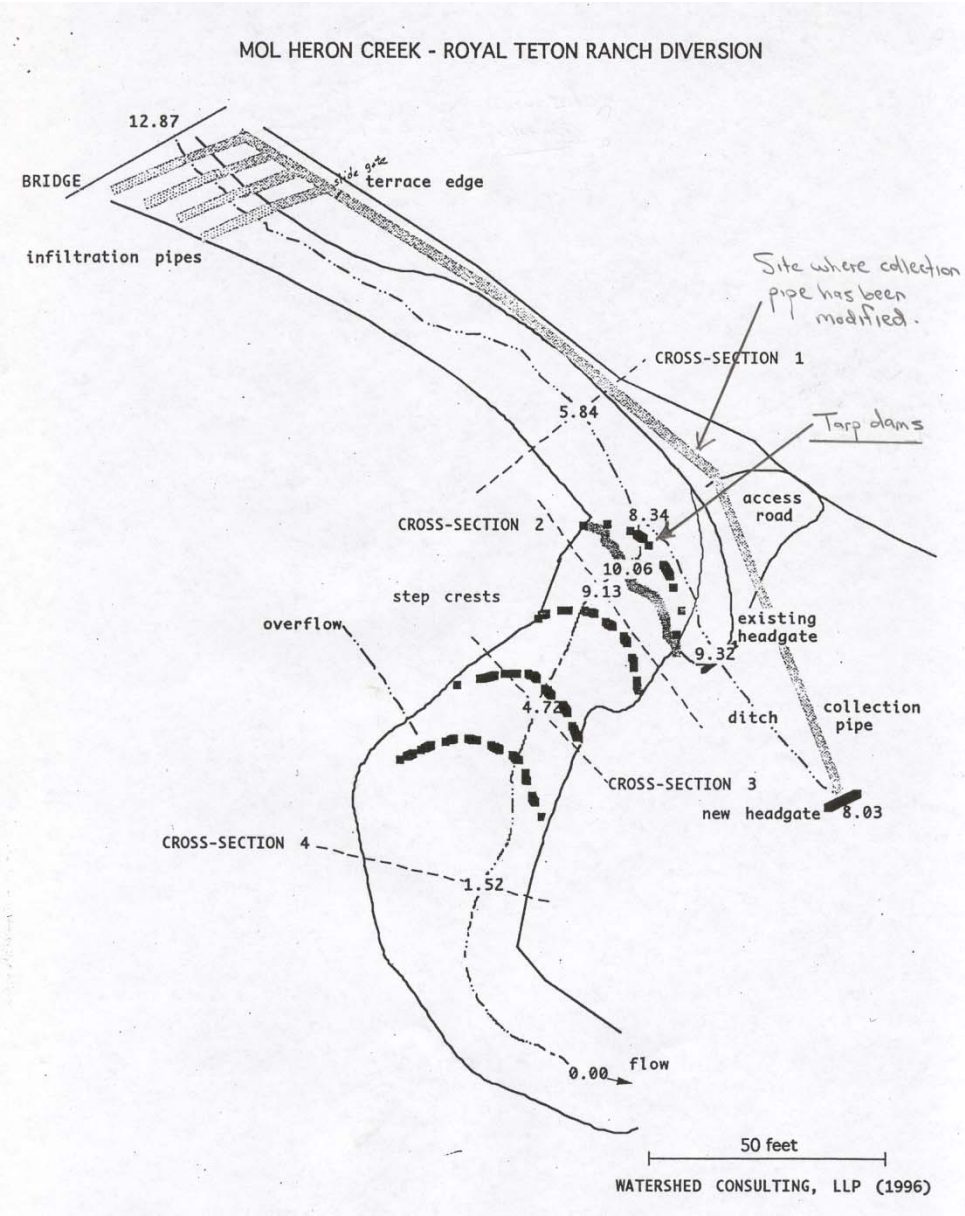


Figure 2. Diagram of infiltration gallery installed in the 1990s.

Figure 3. Modified collection pipe that allows entrainment of Yellowstone cutthroat trout fry and fluvial spawners.

In the 2000s, a second attempt to install a screen began, but was called off. Upon further review of the designs, several shortcomings emerged. Specifically, the flow velocity needed to sweep through the standpipe and flush fry back to the river was insufficient. Future Fisheries Improvement Program funds procured for the project were cancelled.

Installation of a Farmers Screen™ (http://farmerscreen.org/about/general/intro/) is the planned approach to prevent entrainment of fish into this irrigation system (Figure 4). Several features led to the selection of this screen type. First, it is designed to handle up to 15 cfs, which will easily accommodate the 12 cfs being diverted. The hydraulics ensures that water moves over the screen surface at a relatively high sweeping velocity, while water flowing through the screen is at a relatively low velocity (Figure 5). This combination keeps fish and debris from impingement. In addition, an oscillating velocity generates a pulsing action that contributes to the self-cleaning properties of the screen. Farmers Screens require monthly visits, as opposed to weekly for other screen types (Jim DeRito, Trout Unlimited, personal communication). The lack of moving parts and its ability to transport debris through the screen are clear advantages to this screen.

Figure 4. Example of a Farmers Screen (courtesy of Famers Conservation Alliance).

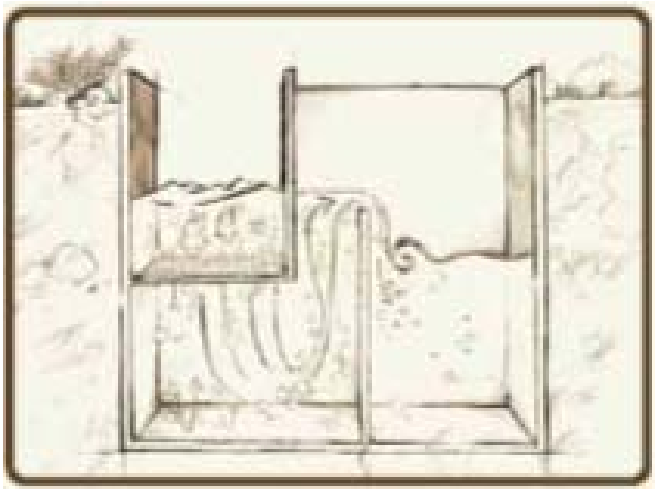


Figure 5. Cross-sectional view of a Farmers Screen (courtesy of Farmers Conservation Alliance).

Currently, engineered plans for the fish screen are preliminary (Figure 6). A waterman gate will be installed upstream from the cut collection pipe. A 20-ft long pipe will capture water downstream of the head gate, which will then feed into the 40-ft long Farmers Screen. A bypass pipe will return fry and adults to Mulherin Creek. Its length will be determined by additional survey.

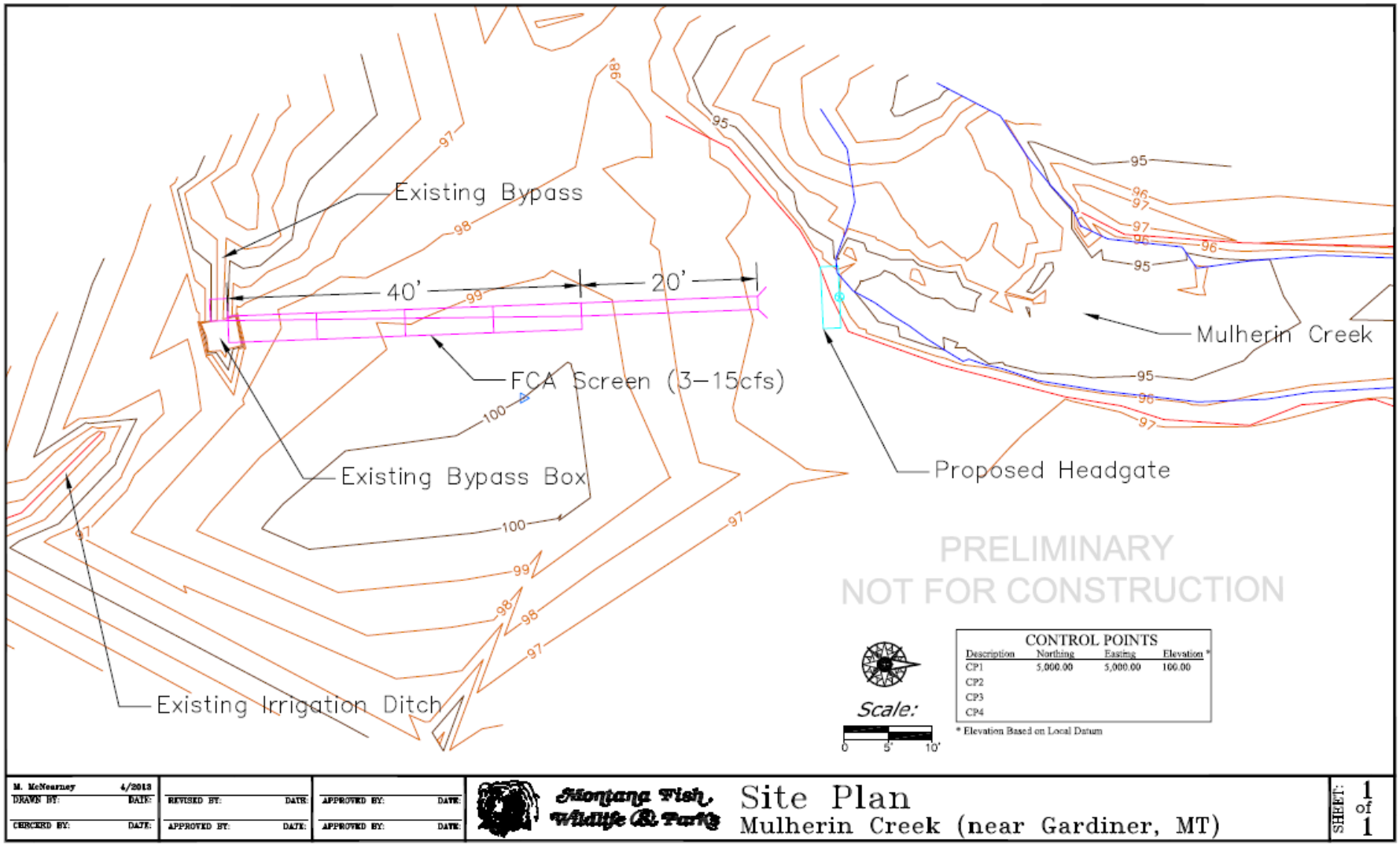


Figure 6. Preliminary plans for the Mulherin Creek fish screen.

Mulherin Creek is a boulder dominated stream and moves large material (Figure 7). To ensure diversion of water and preventing the displacement of rock, large boulders, concrete blocks, or both will be used to divert flows into the head gate. This is the current approach to water diversion and these structures and large rock withstand Mulherin Creek's high flows.

Figure 7. View of Mulherin Creek looking downstream towards the current diversion.

This project complements the Church Universal and Triumphant's ongoing conservation efforts. The church places tremendous importance on stewardship of their 7,500 acres. They routinely work on wildlife, water, and land matters with FWP, the Rocky Mountain Elk Foundation, Trout Unlimited, the Custer Gallatin National Forest, Yellowstone National Park and other agencies. Future, current and past projects include water leases on Reese Creek, Fridley Creek, and Mulherin Creek. They have also collaborated with FWP and the Rocky Mountain Elk foundation on terrestrial stewardship. These include the bison corridor agreement with FWP and a 2.3 square mile conservation easement at Devil's Slide. Finally, they plan and enact their own conservation actions, such as a stewardship plan to address insect outbreaks and wildfire.

Rosgen Channel Type

Using Rosgen (1996) delineative criteria, Mulherin Creek is a B2 stream within the project area. The landform is a structurally controlled, narrow valley, associated with colluvial deposits. It has limited access to its floodplain on the left bank (Figure 7), where only a narrow strip of riparian vegetation exists until the land elevation supports mesic vegetation. On the right bank, a 10-ft

wide floodplain lies between the stream and a road grade, making the stream moderately entrenched. All delineative criteria are consistent with a B2 channel type (Table 1).

Table 1. Rosgen channel type morphologic descriptors.

Channel Material	*Slope*	*Sinuosity*	*Entrenchment*	*Width-to-Depth Ratio*
D_{50} is boulder	0.03	1.2	1.5	14

Citations

Berg, R. 1975. Fish and game planning, upper Yellowstone and Shields River drainages. Montana Department of Fish and Game. Environment and Information Division. Federal Aid to Fish and Wildlife Restoration Project.

Clancey, C. 1998. Effects of dewatering on spawning Yellowstone cutthroat trout in tributaries to the Yellowstone River, Montana. American Fisheries Society Symposium. 4:37-41.

DeRito, J., A.V. Zale, and B.B. Shepard. 2010 Temporal reproductive separation of fluvial Yellowstone cutthroat trout from rainbow trout and hybrids in the Yellowstone River. North American Journal of Fisheries Management. 30:866-886.

Endicott, C.E. and 12 other authors. 2013. Yellowstone cutthroat trout conservation strategy for Montana. Montana Fish, Wildlife & Parks. Livingston, Montana

MCTSC. 2007. Memorandum of understanding and conservation agreement for westslope cutthroat trout and Yellowstone cutthroat trout in Montana.

Rosgen, D.1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

Roulson, L.H. 2002. Water leases and Yellowstone cutthroat trout fry outmigration from four tributaries of the upper Yellowstone River, project year 2001. Report prepared for Montana Fish, Wildlife & Parks. Garcia and Associates, Bozeman, Montana.

Letters of Support

Montana Fish, Wildlife & Parks

1354 Highway 10 West, Livingston MT 59047

December 1, 2014

Ms. Michelle McGree
1420 East 6th Avenue
Helena MT 59620-0701

Dear Ms. McGree:

I am submitting this letter of support for the Future Fisheries application titled Mulherin Fish Screen and Yellowstone Cutthroat Trout Entrainment Prevention being submitted by Carol Endicott. I am aware that Ms. Endicott is requesting $40,000 dollars for the installation of a farmer screen to prevent the entrainment of Yellowstone cutthroat trout.

I support this project and feel that it will significantly contribute to the conservation of Yellowstone cutthroat trout (YCT) in the Yellowstone Basin. Mulherin Creek is one of the few remaining tributaries to the upper Yellowstone River that remains a significant spawning stream for YCT. This project will prevent the documented entrainment of YCT fry and adults in the irrigation system. This project will also add value to the water lease in this stream the FWP currently holds. This project is a significant and important part of Yellowstone cutthroat conservation in the Yellowstone River Basin.

I strongly urge the funding of this project in order to improve this valuable fisheries resource. If I can provide more information or answer any questions please feel free to contact me.

Sincerely,

Scott Opitz
Livingston Fisheries Biologist
406-222-5105
sopitz@mt.gov

cc: Sam Shepard, Region-3 Regional Supervisor
Travis Horton, Region-3 Fisheries Manager

November 18, 2014

Carol Endicott
Yellowstone Cutthroat Trout Restoration Biologist
Montana Fish, Wildlife & Parks
1354 Highway 10 West
Livingston, MT 59047

Subject: Mol Heron Creek Proposed Fish Screen

Dear Ms. Endicott:

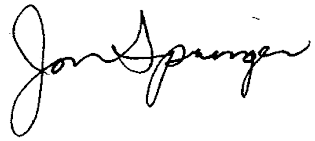
This letter serves as our support for the subject fish screen project. Church Universal and Triumphant continues to be actively involved in wildlife and land conservation efforts and places tremendous importance on stewardship of our 7,500 acres.

Our commitment to fisheries protection is demonstrated with in-stream lease agreements for Mol Heron and Fridley Creeks. We are currently working with MT Fish, Wildlife and Parks, Trout Unlimited, the US Forest Service and Yellowstone National Park on a possible in-stream lease agreement on Reese Creek.

We are committed to assist you in the construction access and implementation as needed to make this project a success.

Should you have any questions, please contact me.

Sincerely,
Church Universal & Triumphant



Jon Springer
Vice President of Operations

Patrick Byorth, *Director*
Montana Water Project

Future Fisheries Improvement Program
Montana Fish, Wildlife & Parks
Habitat Protection Bureau
PO Box 200701
Helena, MT 59620-0701

November 10, 2014

RE: Mulherin Creek fish screen

Dear FFIP Staff and Panelists,

TU's Montana Water Project focuses on conservation and restoration of habitat and water quality and quantity for native and wild coldwater fish. We are glad to support Carol Endicott's proposed fish screen at the Trestle Ranch diversion in Mulherin Creek (formerly Molheron). FWP's history in Mulherin Creek dates back to the late 1990's when FWP first negotiated a water lease to enhance and protect the Yellowstone cutthroat trout spawning run. That water lease is likely to be renewed in 2018. FFIP supported installation of an infiltration gallery that unfortunately malfunctioned because of fine sedimentation although the grade controls acting as a diversion dam has functioned.

In my tenure with FWP and with TU, I have personally worked on Mulherin Creek and am gratified at the response of the cutthroat spawning run and the increased population in the Yellowstone River in the Corwin Springs area. I often hear from TU members how great the cutthroat trout fishing has been in the Yellowstone and how much they appreciate being able to catch native trout. The water lease and improved passage over the diversion, along with culverts improvements have all paid dividends for the fishery. One remaining potential limiting factor is entrainment of both spawners and fry into the Trestle Ranch ditch. The end result of all of this work will be a stable, healthy Yellowstone cutthroat trout population in the Corwin Springs area that pleases anglers. Please support this worthy project. Thanks!

Sincerely,

Patrick Byorth